REMARKS

Claims 1-8 remain pending after this amendment.

Claim Amendments

Claim 1 is amended to state that the liquid ethylene/α-olefin random copolymer is "non-grafted" consistent with the embodiment disclosed at page 13, lines 1-3 of the specification (i.e., graft portion may be present in an amount of from 0-20 % by wt). Claim 1 is also amended to recite the optional presence of a non-conjugated diene, as well as total mol% amounts for the ethylene and α-olefin structural units. Support for these amendments resides at page 12, lines 5-12 of the specification. Claim 1 is further amended to state that the copolymer is formed by a process "consisting of copolymerization", support for which resides at pages 11-12 of the specification. No new matter is added by this amendment.

Interview with Examiner

Applicants thank the Examiner for the courtesy extended toward their representative during the interview of September 9, 2004. During the interview, the proposed claim 1 amendments were discussed. As a result of the interview, the Examiner indicated that the proposed claim 1 amendments would probably assist in distinguishing over the cited prior art, but that

further consideration and/or search would be required. The substance of the interview is summarized in detail below.

Applicants' Invention

Applicants' claimed resin compositions can be used to prepare molded articles having excellent sliding properties, wear resistant properties and impact resistance without impairing the mechanical properties of resin articles.

Furthermore, blending the graft copolymer [B] with the thermoplastic resin [A] in the above amounts, permits the non-grafted liquid ethylene/α-olefin random copolymer [C] to be dispersed homogeneously in the resin [A] without occurrence of phase separation, enabling a resin composition having excellent properties to be prepared. When the resin composition is formed into molded articles, the molded article surface has no wetting nor inferior appearance such as peeling. In molding, the resin composition has no mold contamination because the mold releasability thereof is improved, and has excellent mold processability without impairing mechanical properties.

Applicants again note that the advantages of the present invention are clearly described in the present specification as shown in Example 1, and Comparative Examples 2 and 3. In Comparative Example 2, the mixing procedure of Example 1 was repeated except that the liquid ethylene/α-olefin random

copolymer was not used. In Comparative Example 3, the mixing procedure of Example 1 was repeated except that the ABS resin was not used.

The results are shown in Table 1 below:

Table 1

	Ex. 1	Co-Ex.2	Co-Ex.3
[A] Polyacetal resin	100	100	100
[B] Graft copolymer	5	5	**NOT USED**
[C] Ethylene/α-olefin copolymer:EP1	3	**NOT USED**	3
Mold contamination	AA	AA	CC
Molded article appearance	AA	AA	CC
Dispersed particle diameter (μm)	0.4-1.0	-*1	0.3-4.0
Coefficient of Dynamic friction	0.1597	0.3237	*2 Measurement was unfeasible.
Abrasion loss (mg)	27.4	72.7	
Izod impact strength (J/m)	115	110	79

Note: *1: The component [C] was not added, so that there were no data.
*2: The surface of the molded article had much roughness so that measurement could not conducted.

In Comparative Example 2, the coefficient of dynamic friction is too high, and abrasion loss is too great. In Comparative Example 3, since the component is poorly dispersed, the coefficient of dynamic friction is too high, and abrasion loss is too great. Therefore, it is impossible to measure these values. Moreover, since the component is poorly dispersed, the appearance of the molded article is diminished, and impact resistance (Izod impact strength) is lessened.

In the cited references, a composition containing only a combination of the thermoplastic resin and the graft copolymer, - or - a composition containing a thermoplastic resin and a liquid ethylene/α-olefin random copolymer having polar groups are disclosed. The combination of a liquid ethylene/α-olefin random copolymer [C] (as defined) with applicants' components [A] and [B] is neither disclosed nor suggested by the prior art.

Rejection of Claims 1-8 under 35 USC 103(a)

Claims 1-8 stand rejected under 35 USC 103(a) as being unpatentable over either Kodama et al or Kato et al in view of Hirano. This rejection respectfully is traversed.

Kodama discloses a thermoplastic resin composition comprising a mixture of:

(A) a rubber-reinforced styrene resin which is obtained by graft polymerizing styrene and acrylonitrile in the presence of a rubbery polymer selected from the group consisting of polybutadiene, ethylene-propylene-diene monomer rubber and acrylate copolymers (ABS resin),

(B) polybutylene terephthalate (PBT),

(C) maleimide copolymer comprising (i) N-phenylmaleimide, (ii) styrene and (iii) acrylonitrile or of acrylonitrile and methyl methacrylate, and

(D) an epoxy group-containing olefinic copolymer.

Kodama fails to teach the presence of a liquid ethylene/α-olefin random copolymer in the disclosed composition.

By way of further distinction, the composition of Kodama comprises maleimide copolymer and an epoxy group-containing olefin copolymer, which differs from the composition of the present invention.

Applicants have found that by blending the graft copolymer [B] with the thermoplastic resin [A] in the recited amounts, a liquid ethylene/α-olefin random copolymer [C] (as defined) can be dispersed homogeneously in the resin [A] without the occurrence of phase separation. A resin composition having low mold contamination, excellent moldability, excellent frictional wear properties, and favorable impact resistance can be obtained. Such a result is neither taught nor suggested by the reference.

The additionally-cited Kato reference discloses a polybutylene terephthalate resin composition comprising:

(A) a polybutylene terephthalate resin;

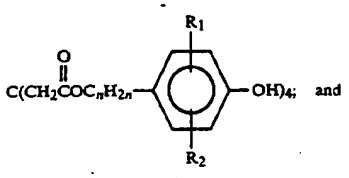
(B) a copolymer of acrylonitrile and styrene;

(C) a graft copolymer comprising:

(C1) from 65 to 75% by weight of copolymer comprising from 75 to 85% by weight of ethylene and from 25 to 15% by weight of glycidyl methacrylate, and

(C2) from 25 to 35% by weight of a copolymer of acrylonitrile and styrene;

(D) from 0.05 to 0.5 part by weight of a hindered phenol compound represented by formula (I):



(I)

wherein n represents an integer of from 0 to 6, and R_1 and R_2 each represents an alkyl group having from 1 to 6 carbon atoms, a substituted alkyl group having from 1 to 6 carbon atoms, or a cycloalkyl group having from 3 to 6 carbon atoms; and

(E) from 0.05 to 0.5 part by weight of a thioether compound represented by the following formula (II):

$$(R_3SR_4COOCH_2)_mC(CH_2OH)_{4-m} \qquad (II)$$

wherein m represents an integer of from 1 to 4, R_3 represents an alkyl group, and R_4 represents an alkylene group.

Kato relates to a connector, which is lightweight and excellent in dimensional stability, heat resistance, mechanical property, and productivity, and also in fitting feeling.

Kato is also silent with respect to the presence of a liquid ethylene/α-olefin random copolymer [C] as defined by applicants.

Both Kodama and Kato fail to appreciate that, by blending the graft copolymer [B] with the thermoplastic resin [A] in the above amounts, a liquid ethylene/α-olefin random copolymer [C] can be dispersed homogeneously in the resin [A] without occurrence of phase separation. A resin composition having low mold contamination, excellent moldability, excellent frictional wear properties, and favorable impact may accordingly be prepared.

These advantages are clearly demonstrated in applicants' specification, such as at Examples 6-7 and Comparative Example 7.

The compositions of Examples 6 and 7 contain [A] the polybutylene terephthalate, [B] ABS resin and the liquid ethylene/α-olefin random copolymer [C]. By contrast, the composition of Comparative Example 7 does not contain the liquid ethylene/α-olefin random copolymer [C]. The resulting polybutylene terephthalate composition was molded to prepare a molded article and it was evaluated in the same manner as in Example 1. The results are shown in Table 3:

Table 3

		Ex. 6	Ex.7	Co.Ex.7
Resin composition				
[A] Polybutylene terephthalate resin		100	100	100
[B] Graft copolymer (ABS)		5	5	5
[C] Ethylene /α-olefin copolymer	EP1	3	5	**NOT USED**
	EP2			
	EP3			
	EP4			
Evaluation result				
Mold contamination		AA	AA	AA
Molded article appearance		AA	AA	AA
Dispersed particle diameter (μm)		0.2-1.0	0.2-2.0	-*1
Coefficient of Dynamic friction		0.1442	0.1367	0.3355
Abrasion loss (mg)		2.6	2.4	12.5
Izod impact strength (J/m)		76	68	63

*1: The component [C] was not added, so that there were no data.

In Comparative Example 7, the coefficient of dynamic friction is too high, and abrasion loss is too great.

Unless the liquid ethylene/α-olefin random copolymer [C] and the graft copolymer [B] are used in combination with component [A] (a combination that is neither taught nor suggested by the cited references), it is difficult to improve the sliding properties, wear resistant properties and impact resistance of articles. That is, the objects of the present invention cannot be accomplished.

The additionally-cited Hirano reference does not cure the deficiencies of Kodama et al or Kato et al.

Hirano discloses a molding resin composition comprising:

(A) 100 parts by weight of a resin selected from the group consisting of polyacetal resin, ABS resin, polyamide resin, polyphenylene oxide resin, polyimide resin, thermoplastic polyester resin, polycarbonate resin, epoxy resin, thermosetting unsaturated polyester resin and phenolic resin, and

(B) 0.1-15 parts by weight of, at room temperature, a liquid ethylene-α-olefin random copolymer having polar groups,

wherein (a) said ethylene-α-olefin random copolymer comprises 30-70 mole % of ethylene unit and 30-70 mole % of α-olefin units based on its total structural units, and wherein said ethylene-α-olefin random copolymer having polar groups has (b) a number average molecular weight (Mn) of 500-10000, and (c) a molecular weight distribution (Mw/Mn) represented by the ratio of the weight average molecular weight (Mw) to the number average molecular weight (Mn) of 1.2-3.

In contrast to Hirano's use of a liquid ethylene-α-olefin random copolymer having polar groups incorporated therein, applicants employ a non-grafted liquid ethylene/α-olefin random copolymer consisting of ethylene, an α-olefin having 3 to 20 carbon atoms, and optionally a non-conjugated diene structural unit, which random copolymer has a proportion of a structural

unit derived from ethylene of from 20 to 80 mol%, and a proportion of a structural unit derived from an α-olefin of from 20 to 80 mol% based on all structural units, with said structural units of ethylene and α-olefin being present in a total amount ranging from 90 to 100 mol%.

The graft copolymer [B] is present as an essential component in the present invention, in contrast to the teachings of Hirano.

The graft copolymer [B] of the present invention is further comprised of an olefin polymer (B-1) as a backbone polymer, and a vinyl (co) polymer (B-2) as a graft chain. Due to the presence of the two different polymeric components in the graft copolymer [B] molecule, the compatibility between thermoplastic polyester resin [A] and the liquid ethylene/α-olefin random copolymer [C] is much improved.

Further, due to the presence of the graft copolymer [B], the liquid ethylene/α-olefin random copolymer [C] can be dispersed homogeneously in the resin [A] without occurrence of phase separation. As a result, the resin compositions have excellent molding processability. That is, neither deterioration in appearance such as surface wetting and peeling of molded articles, nor mold contamination occurs when formed into molded articles due to improved mold-releasability in molding.

These effects of the graft copolymer [B] are shown in the following Table 2:

Table 2

		Ex. 6	Hirano Trace
[A] Polyacetal resin		100	100
[B] Graft copolymer		5	**NOT USED**
[C] Ethylene /α-olefin copolymer	EP1	3	**NOT USED**
*1) copolymer having **polar groups**			3
Dispersed particle diameter (μm)		0.1-1.0	0.4~10
Coefficient of Dynamic friction		0.1442	0.2031
Abrasion loss (mg)		2.6	1.0
Izod impact strength (J/m)		76	46

*1: The Ethylene/α-olefin copolymer is modified by maleic anhydride as described in Hirano Examples.

Since the graft copolymer [B] is present in the Example 6 composition, the compatibility between thermoplastic polyester resin [A] and the liquid ethylene/α-olefin random copolymer [C] is much improved, and the dispersed particle diameter of the Example 6 composition is smaller than that of Hirano trace. The resin composition has excellent molding processability. That is, there is neither deterioration in appearance such as surface wetting and peeling of molded articles, nor mold contamination when formed into molded articles. The combination of components

taught by Hirano does not suggest applicants' recited combination of [A], [B] and [C].

The Examiner in the Advisory Action takes issue with applicants' position on the ground that the comparative data relied upon does not, in effect, direct itself to the teachings of the references. The Examiner also takes the position that applicants' claims "do not exclude grafting in component C of the instant claims" in relation to applicants' attempt to distinguish over Hirano.

Applicants reiterate their disagreement with the Examiner's position.

With respect to Hirano, the reference teaches the addition of the low molecular weight ethylene/alpha-olefin polymer to "one kind of resin" selected from the group consisting of polyacetal resin, ABS resin, polyamide resin, polyphenylene oxide resin, polyimide resin, thermoplastic polyester resin, polycarbonate resin, epoxy resin, thermosetting unsaturated polyester resin and phenolic resin. See the paragraph bridging columns 1 and 2 of the reference. The reference at worst expressly teaches away from a composition which contains a mixture of two or more of the above resins, and at best merely teaches the combination of a low molecular weight polymer with other polymers. Neither conclusion assists that Examiner.

Further, as discussed at column 1, lines 38-49 of the reference, one problem with the addition of a low molecular weight ethylene/alpha-olefin polymer to such resins is incompatibility, which results in phase separation between the respective components. Hirano attempts to address this problem by inclusion of polar groups (such as by grafting) in the low molecular weight resin.

By contrast, applicants address this problem by the inclusion into a mixture of a thermoplastic polyester resin [A] and the low molecular weight ethylene/alpha-olefin polymer [C] of the recited graft copolymer component [B] having a specific structure - i.e., a vinyl compound grafted on an olefin polymer backbone. Exemplary vinyl graft components are recited in pending claim 2, and include vinyl aromatic compounds, vinyl cyanide compounds, and (meth)acrylic ester compounds.

The presence of the graft copolymer [B] overcomes the problem of phase separation - a problem which Hirano attempts to solve in a completely different way, thus failing to teach applicants' invention.

Indeed, as applicants' claims now provide for the use of a non-grafted liquid polymer component (C) consisting of the respective copolymer components produced by a process consisting of copolymerization of the respective components consistent with the discussions which occurred during the interview (see

Interview Summary Record), Hirano's teachings are even less relevant.

In view of such distinctions, one of ordinary skill in the art would not look to Hirano to solve the problem of phase separation in the manner suggested by the Examiner - instead, one of ordinary skill in the art would modify the low molecular weight polymer in the manner suggested by Hirano, and would be directed away from the use of applicants' graft copolymer [B].

To yield applicants' invention based on the teachings of Hirano, one of ordinary skill in the art would, in violation of the teachings of Hirano, not only have to (1) employ a mixture of base polymers together with the low molecular weight polymer, and (2) have to select the proper mixture of base polymers utilizing the graft copolymer specified by applicants' claims, but would have to (3) avoid use of the modified liquid polymer required by the patent. Nothing in Hirano or any other of the cited references leads one of ordinary skill in the art to such a result.

In view of the above, applicants believe that the Examiner has failed to present a *prima facie* case of obviousness. As such, the Examiner's asserted objections to the comparative data presented by applicants are without basis. The rejection is without basis and should be withdrawn.

The application is now believed to be in condition for allowance and an early indication of same is solicited.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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